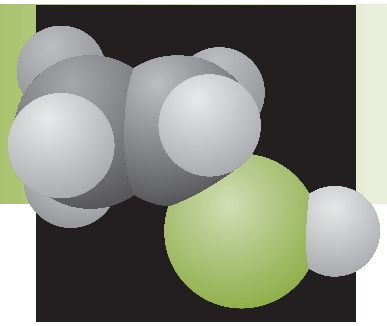
CHEMICALS
Project Fact Sheet



Development of Selective Surface Flow (SSF™) Membranes for Applications in Chemical and Refining Industries

Benefits

- Receives valuable chemical components
- Reduces NO_x, CO_2 and VOC emissions
- Improves energy efficiency of refineries and chemical plants
- Decreases cost of polymers and petroleum fuels

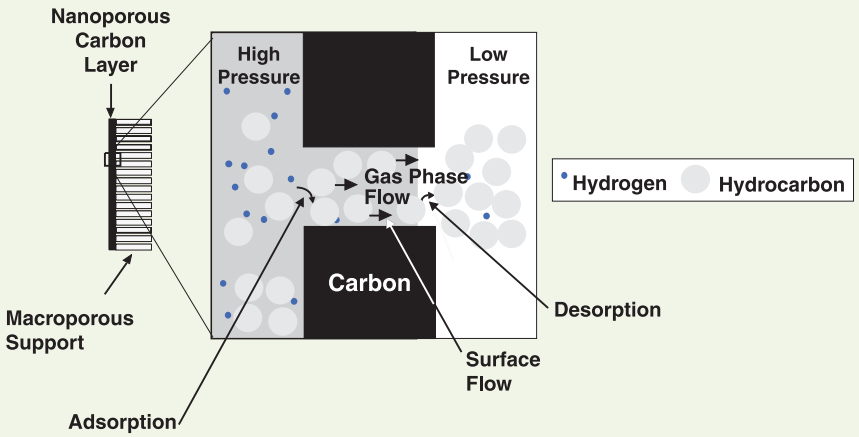
Applications

Applications under evaluation include recovering valuable components of refinery waste and fuel gases, recovering polyolefins from vent gases, upgrading natural gas, and managing acid gases in refining operations. The technology can potentially replace less efficient refrigeration based condensation, polymer membrane or adsorption systems.

Highly Selective Membrane Recovers Valuable Components from Waste Gas Streams

A novel gas separation membrane has been developed with unique capabilities for separating components in hydrocarbon gas streams. The advantage of Selective Surface Flow (SSF™) membranes over conventional polymer membranes is that lighter components in the gas mixture are retained at high pressure while the heavier components permeate through the material. With this technology, valuable components can be recovered from waste gas streams that are presently flared or burned as fuel. Many potential applications exist for this technology in the petroleum refining, chemical processing and natural gas processing industries.

Separation Mechanism in Selective Surface Flow Membrane



Innovative SSF™ membrane can recover valuable products from waste gases that are currently vented, flared, or treated.

Project Description

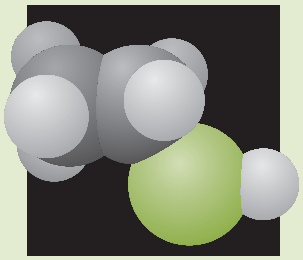
Goal: Identify and demonstrate SSF™ membranes as a viable option for one or more petrochemical applications.

This project will identify specific applications where SSF™ membrane technology is the lowest cost option for recovering valuable components. Targets include replacing refrigerant-based partial condensation systems, polymer membrane, or adsorption systems currently used in chemicals and petroleum refining.

Detailed evaluations of product requirements for specific applications will be conducted with close customer participation. Concurrent laboratory research focusing on improving membrane performance and reliability will develop a product uniquely suited to the requirements of each application. Field and laboratory trials using the actual process streams for the application will provide valuable data and the opportunity for end users to evaluate the product firsthand. Energy savings, waste reduction and air quality improvement impacts of this technology will be evaluated for up to 10 individual applications.

Progress and Milestones

- Agreements for obtaining access to specific customer streams are targeted for April 1999. By September 1999 one or more applications will be recommended for field trials.
- During FY 2000, major components of the membrane system will be tested with the actual process stream for separation performance and reliability
- During FY 2001, the commercial system will be designed and a prototype membrane unit will be built and tested. Final acceptance of the complete system will lead to commercial introduction at the end of FY 2001.



Project Partners

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February 1999